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ABSTRACT

The paper explores origins of and behavioral science influences on three educational slogans: (1) structure, (2) learning by discovery, and (3) any subject can be taught. These slogans can be traced through four stages. Stage I consisted of practical reform projects of the early 1950s. These projects were marked by a wish to strengthen content and maximize development of the student learning process. Concepts were defined descriptively and stipulatively and were oriented toward subject matter. Reports from the Woods Hole Curriculum Conference in 1959, which formed the basis of Stage II, attempted to analyze and evaluate major curriculum projects and ascertain implications for curriculum development. This stage showed an emphasis on psychology, little emphasis on content, and the emergence of structure and learning by discovery. Stage III, which is exemplified by "The Process of Education," Jerome Bruner 1960, concentrated on programmatic definitions, urged research, and suggested that any subject can be taught. Stage IV comprised attempts to develop programs based on simplified interpretations of Bruner's research. During this stage, Bruner's definitions and concepts became reduced to slogans. Findings from analysis of these four stages indicates that educational discourse and curriculum changed concurrently, moving from an emphasis on the logical and psychological aspects of education to an emphasis on psychological aspects only. It is concluded that when these definitions became simplified, they emerged as educational slogans. (CK)

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THE ORIGINATION OF SOME PROMINENT CURRICULUM SLOGANS: THE SIDE EFFECT OF BEHAVIORAL SCIENCES?

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by

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I

When a European - from the outside - attempts to get a broad perspective of the educational issues in the U.S. during the last two generations, he can hardly avoid being confronted with a paradox: In the U.S. there have been extremely good conditions for educational research and development, probably better than in any country in the world. Since the beginning of the century there have been established within colleges and universities departments and schools of education that seems to be equal to other departments and schools as far as resources such as staff, equipment are concerned. And outside the institutions of higher learning there are quite a few agencies that are solely occupied with research or development programs in the field of education. In short: By way of available academic tools, the field of education has been intensively cultivated through generations. But alas! - and that is the shocking paradox - the field does not, as a whole, seem to be very well tilled. Here and there we may observe the weed growing rather unrestrainedly. The weeds that I have in mind are the slogans. They are easily and frequently adopted, not by parents and members of local School Boards only, but even by educational experts with academic status - especially if the slogans are useful for practical purposes.

During the last two generations both scholars and laymen have been highly influenced by different sets of educational slogans. In the twenties and thirties the following set had a great deal

of popularity: "The Child-Centered School", "No teaching without Learning", "I don't teach Subject-Matter, I teach Children". In the sixties the winds had shifted in another direction: "The Structure of the Discipline", "Learning by Discovery", "Any Subject can be taught", "Behavioral Objectives". From the end of the sixties another slogan has been widely adopted, the educational slogan "Relevance". Today, however, there is even another set of slogans resounding from coast to coast: "Back to Basics", "Accountability".

This paradox - the scientific work and the slogans - as closely connected as the farm equipment and the harvest - provokes me to ask an impertinent question. The main topic of this AERA-conference - "improvement of the disciplined enquiry paradigms and the methodologies employed by educational researchers" - gives me the confidence to ask: Is it the educational science itself, with its particular American approach, that in a more or less subtle way, creates the slogans? - Anyhow, my thesis is this: A number of educational slogans from the last two generations may be regarded as side effects of the behavioral tradition that has been so predominant in American educational research in the 20th century.

I would like to test this thesis by discussing the origination of one particular set of slogans: "Structure", "Learning by Discovery", "Any Subject can be taught".

The fact that these slogans gained such great popularity is, above all, due to the best-seller by the Harvard psychologist

Jerome S. Bruner: "The Process of Education", published in 1960. The book did not pretend, however, to be produced by Bruner alone. It was supposedly a "Chairman's Report" from a ten days' curriculum conference, held at Woods Hole, Cape Code, Massachusetts, September 1959. Further, this conference had its particular background from the curriculum development projects of the fifties aiming at new and better teaching programmes, especially in mathematics and science on the high school level.

The history of the set of slogans which is our concern is quite a short one, encompassing less that ten years. In spite of this short time span it could be divided into four characteristic stages.

The first stage has its starting point in some fumbling practical reform enterprises. The reformers are more conscious about what they wanted to get away from than what they wanted to work towards. As the reform developed, the whole enterprise acquired a more distinct direction and an increased sence of awareness about what it was aiming at. Statements of direction and aims differ, however, and there is no standardized verbal description. This stage begins in the early fifties and culminates with the opening of the Woods Hole Conference. - The second stage covers the discussions of this ten days conference. Theorists with an interest in what was going on in the field of curriculum make their attempts to analyze, comprehend, articulate, and evaluate the reform projects from different points of view, according to their specialized interests and backgrounds. During this conceptualization some aspects of the curriculum making were brought into focus. Those aspects were given an approximately

distinct and standardized description. The conference reveals, however, different interpretations on the reform movement, and its implications for the future curriculum development. - In the third stage, represented by the well known and easily available report "The Process of Education", one of the theorists, Jerome S. Bruner, makes an attempt to describe the discussions of the Woods Hole Conference. This attempt is made, consciously as well unconsciously, within a psychological frame of reference, and in a language with an built in appeal for action.- From this particular interpretation and its engaging literary form the slogans develop. This is the fourth and last stage.

II

Evidence for my suggestion that the educational slogans, at least in this case may be regarded as side effects of modern American behavioral science, shall be justified in two ways. First, by pointing out some characteristic changes in the substance of the general educational discourse. Changes towards a strong emphasis on the psychological aspects of teaching connected with a seeming disregard for the intrinsic natur of the subject matter. And, secondly, by an analysis of some central feature of the educational language unfolded during the four stages outlined above.

In order to point out these changes in the educational discourse I shall make use of the following analytical distinctions: The discussion on content and methods may be said to have been

running along two main dimensions. One dimension has to do with the subject matter into which the students should be introduced and within which they should work. This subject matter may be loosely or rigidly organized. The subject matter is loosely organized, when the spontanous interest of the students forms the starting point for planning and teaching. It is rigidly organized when the subject matter is molded after the academic disciplines. And between these extremes one finds various moderate positions. The second main dimension has to do with psychological aspects of the learning process. One extreme is receptive learning, and the other is that the student should be his own discoverer. Between these extremes there may be found quite a few variants.

The all pervading idea of the curriculum projects developed during the first stage was to strengthen the content or subject matter by bringing it up to date, by selecting it carefully, and by organizing it in a sequential way. However, the attention was not directed toward content only. There was also a considerable awareness of the psychological dimension, that is, of the activity of the students. The reformers were interested in expanding the students activities into forms that could lead to maximizing the development of the students intellectual capacity, their skills, and their attitudes.

Some examples will make this clear: In PSSC (Physical Science Study Commitee), the content or the subject matter is made more accessible by arranging it around the "powerful ideas" of the

physical science, and at the same time improving conditions for stimulating the "spirit of inquiry" as a method of learning. In BSCS (Biological Sciences Curriculum Study), the emphasis was on content arranged around "the great biological themes", and, simultanously, on a laboratory teaching through which students could get a taste of "scientific inquiry". In CHEME-Study, they stressed "an excellent set of laboratory experiments", and the teaching of "the importance and limitation of concepts". Max Beberman, the leader of UICSM (University of Illinois Committee on School Mathematics), states in 1958 that the two main principles behind the whole project was the "precision of language" - concerning the subject matter, and "learning by discovery" - concerning the students learning activity.(1)

This momentum of the first stage does not exist in the second. A change is taking place to which a number of external circumstances contribute. The first stage was dominated by scientists and scholars - among them ten Nobel Prize winners.(2) Their cooperators were experienced teachers in the high school. This led to a selection of subject matter according to criteria based upon the respective disciplines and a sequencing and organizing of it according to educational common sense.

In the second stage, where attention was focused on "a general appraisal" of the curriculum projects, "so as to better guide them in the future",(3) a large part of the group consisted as before of scholars and scientists representing the main disciplines in the high school curriculum. But they were not the only academic experts. Psychologist with different research

orientation,with the inclusion of educational psychology, were joining them. Educationalists, however, with curriculum theory as their field, were not invited.[4] Compared to the group engaged in curriculum development in the first stage - scientists and scholars on the one hand and teachers on the other - the group at this stage - scientists, scholars and psychologists - obviously had less practical educational experience, and also, presumably, less educational common sense. Entering the arena now were psychologists with their theories of learning and intellectual development. One of these, Jerome S. Bruner, was even appointed chairman of the conference. - From this it can be assumed that the psychological way of thinking would be exerting a major role in the discourse.

A closer look at the themes under discussion during those ten days at Woods Hole will make this even more clear. During the first days the curriculum reform projects were presented. In addition, Bärbel Inhelder gave an account of the studies on children's thinking by the Geneva group, and Richard Suchman of his studies on "inquiry training". There was also an element of teaching demonstration. David Page had even assembled pupils for his mathematics lesson. B.F. Skinner demonstrated his hardware, his recently developed teaching machines. The main work of the conference, however, seems to have taken place within the five "work groups" established after a few days. They were assigned the following themes for discussion: "Sequence", "Apparatus of Teaching", "Motivation", "Intuitive Thinking", and "Cognitive Factors in Curriculum Design".[5]

The formulations of themes alone reveals to which extent the content or subject matter itselves no longer was the focus of attention. Learning and thinking in general and some technical equipment and aids for organizing the learning experiences occupied the main interest.

The lack of relatedness to the subject matter is especially noticable in two of the group reports. The report on the apparatus of teaching are only dealing with audiovisual aids and a particular teaching method, called TLSA (Teaching-Learning System of Approach).[6] The report on motivation consentrates on operations for collecting evidence on motivational outcomes. The "outcomes" are described in terms of pure psychological cathegories like "problem-solving attitude" and "affective orientations" under "long-term outcomes", and "arousal", "sense of direction", "expectancies", and "social interaction" under "immediate outcomes" [7]

The remaining three reports are also designed within a psychological frame of reference, but here there are, at least, some referal to relevant fields of knowledge. According to the report on intuitive thinking mathematicians, physical scientists, and biologists engaged in curriculum development projects are fully aware of the value of intuitive thinking in their fields. At Woods Hole, however, they are asking for psychological knowledge and research on intuition. [8] The report on sequence distinguishes between two dimensions, one "taking into account subject matter", the other "various practical and psychological considerations affecting the order of topics".[9]

The third and last report, the report on cognitive factors in curriculum design is of particular interest. It was made by a group consisting of the following members: the psychologists Jerome S. Bruner and Bärbel Inhelder; the mathematicians David L. Page (Illinois Arithmetic Project) and Edward Beagle, SMSG; the physical scientist Francis L. Friedman, PSSC; the biologist H. Burr Steinbach, BSCS; and the historian Donald Cole.

The report of this group consist of three main parts. The third part is obviously extracted from a memorandum prepared for the conference by Bärbel Inhelder. (10) The first and second part are both characteristic of Jerome S. Bruner's composition and linguistic style. The content, however, disclose a certain state of tension. On the one hand, there are a number of statements which most likely had been made by the representatives of the reform projects. These statements always indicate a intimate relationship between the substantial and the psychological aspects as typical for stage one. On the other hand, there are statements that almost only emphasize the psychological aspects. These statements clearly bear the stamp of Bruner's thinking before and immediately after the conference. (11)

For instance, in the section called "Structuring Information in Learning" different kinds of "psychological connectedness are discussed. It is drawn into attention that this means something different from "logical or scientific connectedness". Although "good psychological connectedness often consists simply of grasping the inherent or logical connectedness in an array of material". (12) It is further said that such effective connectedness can be aided by the development of certain attitudes

and heuristics in the learner. And then we find a dual line of thought that discloses the above mentioned state of tension between the psychologist Bruner on one hand and the scholars and scientists who represent the disciplines on the other.

From these representatives I quote: "Each field will have its own particular heuristics". They refer, among other things, to the fact that "one of the principal organizing heuristics in biology is the persistent question, "What function does this thing serve?"" (13) From the curriculum projects in physical science and mathematics there are also given examples showing the importance of heuristics of this disciplines for the orderly sequencing of subject material in school.

The opposing camp of psychologists has an entirely different emphasis. It says: "it is a general attitude that seems to be more important than any particular heuristic". In this case there is a very loose connection with any particular subject matter. The "general" attitude is defined as "the attitude that leads one to search for the manner in which ideas are related to each other and ideas are related to date". One is of course, aware of the fact that a series of problems arise in connection with "general training in thinking as such". However, great expectations are placed on scientific research on these problems especially focused on the actualization of "learning how to learn". (14)

In dealing with what is called "the explicitness of one's understanding of a body of knowledge" two possible research topics are suggested; topics that also reflect a similar dualism. (15)

The first research topic which is a very important one from the point of view of a curriculum and its pacing, has to do with how far a child can be carried in his understanding, say, of mathematics "by progressing inductively through concrete examples to a non-explicit understanding of principles of mathematics". There are references made to the work of the Geneva psychologists and to Bärbel Inhelder's memorandum. - The second research topic is said to deal with "a more subtle question". If it is the case that, - so it is reasoned - by inductive, non-explicit teaching one can carry the child through a long reachs of mathematical reasoning before he is capable of understanding the formal issues, then the following inquiry can be made: is it efficient to instruct him in this way or might one not get just as much by waiting to begin his instruction until he is capable of formal understanding? It is pointed out that research is needed not simply from the point of view of knowing whether inductive, implicit understanding makes later formal understanding more "solid", but also as to "whether early inductive training of the kind described has the effect of changing the attitude and values of children towards learning and thinking generally".

In the section dealing with "Heuristics in Learning" it is said that in acquiring the sense of the structure of materials it is possible to distinguish "between the acquistion of the knowledge itself and the acquistion of the strategies for finding structure and regularities in the environment". (16)

The question of how "learning how to learn" should be the result of mastery "as well as the learning of substantive material" is

introduced by way of a very interesting example. It is not taken from the students engagement in subject matter materials in the school. The example is "the maze-wise rat"!

> "There is no question that a rat who has been used in a prior experiment on learning does better when he is introduced into a new experiment even though the conditions of the second experiment be strikingly different from the original. This is the generalized phenomenon of learning set. -- The other feature of a learning set is that it may well be that having learned to unmask one kind of regularity in nature the organism is better able to unmask other regularities. Indeed, there is considerable evidence to indicate that this is precisely the case --. Might it not be worth considering whether maze-wiseness in its more extended sense might be considered not only an instrument to be acquired to aid one in further learning but that it might also be conceived of as one of the objectives of education? Can there be such a thing as separate and distinctive training for maze-wiseness in the sense that one might be able to train inquiry, or does one have to do the training on specific subject matter materials?" (17)

Jerome S. Bruner has given his report the title "The Process of Education". The title is very adequate because his report deals with the process of acquistion of knowledge, and only to a moderate degree with that process and its substantial content. The whole account has been produced within a psychological frame of reference. True, there are being used examples from different fields of knowledge - mathematics, physical science, biology, history - but the examples seem to disclose some rather super-

ficial understanding of these fields of knowledge and their style of thought. This becomes quite obvious as far as humanities are concerned. (18)

So Bruner's report - that is, the third stage in the development of the slogans - represents a further step towards psychological one-sidedness. In this case, where we are dealing with an easily available book, my claim doesn't require the same extensive documentation as when I was dealing with unpublished material. However, at least one point should be brought to attention, and that is Bruner's concept of structure. The frame of reference shows his psychological bias. Some quotes exposes this. His basic concern is: "the role of the structure in learning and how it may be made central in teaching" (my emphasis). In the chapter "The Importance of Structure" we also find that his starting point is not the subject matter material but transfer of learning - of what is termed "specific transfer" and "non-specific transfer". The latter is said to be "at the heart of the educational process". Accordingly the expected final result is not knowledge but "learning how to learn". (19)

If this objective is seen in relation to what the reformers at the first stage were aiming at, the change in emphasis is quite clear. At the first stage we saw a two dimensional way of thinking, the one representing the content or subject matter introduced, the other representing the students learning activity, involving various psychological factors. At the third stage we are confronted with a way of thinking almost completely within a psychological frame of reference.

How this accentuation of the psychological aspects in a more specific way contribute to the development of the set of slogans in concern it a question we temporarily will wait with. We must first clarify certain characteristic features with the educational language used.

III

In the monograph "The Language of Education" Israel Scheffler makes a distinction between three sorts of statement often encountered in discussions of education. "These are statements of definitions, statements embodying educational slogans, and statements containing metaphorical descriptions of education". (20) On this occasion it is only necessary to deal with the first two kinds of statements a little more closely.

Statements of definition may, according to the context in which they occur in general educational discourse, establish themselves as stipulative definitions, as descriptive definitions and as programatical definitions. "The interest of stipulative definitions is", according to Scheffler, "communicatory, that is to say, they are offered in the hope of facilitation discourse; the interest of descriptive definitions is explanatory, that is, they purport to clarify the normal application of terms; the interest of programmatic definitions is moral, that is, they are intended to embody programs of action". (21)

Educational slogans are unlike definitions in a number of ways.

"They are", according to Scheffler, "altogether unsystematic, less solemn in manner, more popular, to be repeated warmly or reassuringly rather than pondered gravely".(22)

Scheffler point to the fact that stipulative definitions of the "non-inventive" variety often have a tendency to glide over to programmatic definitions. The word "curriculum" is a good example in this context. When references are made to "the totality of experience of each learner under the influence of the school", then the word 'curriculum' takes on another meaning than usual. The definition has acquired an "intended distinctiveness". And taken in the total context it will have a tendency to make the definition programmatic as well. The school's responsibility then should not be limited to the "so-called formal course of study", but encompass "the individual social and psychological development of its students".(23)

It seems to me that programmatic definitions under certain conditions often have a similar tendency to be transformed into slogans.

In our case we shall see how statements that included "Structure", "Learning by Discovery" and "Any Subject can be taught..." are through the first and second stage essentially of a stipulative character. At the third stage there is a change. The statements acquire a more programmatic colouring. From the programmatic definitions at the third stage to the slogans in the fourth, the distance are rather short.

This movement from stipulative definitions through programmatic definitions into slogans is - and that is my thesis - clearly connected to the behavioral research tradition in the U. S. In this tradition stipulative definitions play a major role and at the same time there is a tendency to overlook the importance of dealing with descriptive definitions, which give more precise terminology to the educational issues and in turn have a stabilizing impact on educational language in general.

The terms used during the first period were used to point out what was most essential within the curriculum reform movement. The terms with a subject matter orientation were first and foremost, "the great themes", "precision of language","basic issues", "key concepts", and the like. The terms with a strong psychological or process orientation were "the spirit of inquiry", "scientific inquiry", and "laboratory experiments". It is worth noting here that the term "structure" had no predominant place in the educational vocabulary at this time. "Learning by discovery" was, however, gradually being established as a term indicating the pupils attitude and methods in mathematics.(24)

At the second stage - that is, during the Woods Hole Conference - both 'structure' and 'discovery' are employed. And, at the same time one will find tendencies towards the development of the statement, "Any Subject can be taught".

Judging by the group reports, however, there is little indication as to a concensus of meaning or the constructive directions that

these words could have. Only in one of the group reports does these word assume a central role and that is in the report on cognitive factors in curriculum design. In two other reports both the words and their corresponding issues occur. In the remaining two we find neither of them.

The report were expedited, as mentioned earlier, in a work group consisting of both Bruner and Inhelder. In this report's three major sections, the third section included an abstraction of a memorandum by Inhelder. Here there is reference to "structure", "discovery", and we also see formulations which could be used, to form a language basis for the third slogan.

The term 'structure' is employed for indicating characteristic features of scientific thought. A comparison is drawn between discoveries of scientific thought and the learning of the child. In both cases we are dealing with stipulative definitions.

> We believe, says Bärbel Inhelder in reference to the Geneva school, that "teaching which is based simultaneously on the psychology of the child and on the basic structure of scientific thought" is better able to concentrate on essentials and thus penetrate to the heart of the subjects. " --- " The most elementary notions of reasoning whether logical, arithmetical, geometrical or physical, all rest on one basic principle: the invariance of quantities, --". This principle, is however not, " an a priori datum of the mind or the results of purely empirical observation; it is discovered by the child in a manner which (all proportions being respected) is comparable to the discoveries of

scientific thought". (25)

> A teaching method which takes into account the natural thought processes, will enable the child to discover the principles of invariance, by giving him an opportunity to overcome the abstract and exercise the relevant operations. For it is through activity which is at first concrete and then formal that the mind acquires a certain mobility which comes closer and closer to the reversibility of mathematical and logical operations". (26)

The linguistic foundations for the third slogan appears, according to the report, in following context:

> Bärbel Inhelder points out that in the majority of European schools the teaching of Euclidian or metric geometry only starts at the end of the primary grades (10 to 12 years): that of projective geometry is either completely neglected or given only at the end of the secondary grades (17 to 19 years), and there is no introduction to the notions of physics before the age of fifteen. "Our psychological investigations, seems however to indicate", says Inhelder, "that these notions are perfectly accessible to children of 7 to 10 years, provided that they are divorced from their mathematical expression and studied through materials that the children can handle themselves." (27)

After having discussed the matter more fully and presented examples, she draws the following conclusions: "We therefore think it possible to draw up methods of teaching the notions of science to children younger than the traditional age, and of laying the first stages of systematic instruction later on at the secondary level". (28)

In the two remaining sections the terms 'structur' and 'dis-

covery' are frequently applied. In the section on "Structuring Information in Learning" the concept of structure is introduced in the following way:

> "We take it as evident that when a person acquires that knowledge about a subject matter, he acquires that knowledge in an organized form or, to put it in other terms, that he imposes an order on it or an order is imposed on it by somebody else. The structure of a set of data may be no more complicated than a shopping list, but it usually is. It may be organized in terms of spatial principles - what is next to what or spatially connected with what - or hierarchically or sequentially or connected by more complicated relations than any of these. We have concerned ourselves with those characteristics of structure that seem to affect the way in which the knowledge so organized might be used afterward by the learner". (29)

As we see from this the concept of structure, even from the beginning, receives a quite comprehensive and loose meaning. It reveals a kind of organization, the simplest being a "shopping list". At the same time it occurs in contexts where the transition from stipulative to programmatic definitions are easily made. In the discussion of the idea that the knowledge "might be used afterwards by the learner" we find an example of this transition. The starting point is how knowledge may be more or less in correspondence with existing data. This leads to a discussion of how knowledge may also be organized in such a way as to be more or less open to correction and revision by newly encountered data. This again ends up with the question: "Could it be that we could accomplish more in our teaching if students were given specific practice in milking implications from data?" (30)

On the occasions where the concept of structure is applied, there are also some corresponding lines to what one could call "heuristics in learning", that is to say non-rigorous procedures used for efficient or rapid storage of information, in solving problems, in finding the structure of a field of knowledge, and in transmitting effectively to other people.

Heuristics in connection with the two activities last mentioned becomes essential for "heuristics of pedagogues". And in that relationship "discovery" is brought in as a key word. It happens in connections which give it a stipulative and to certain degrees a programmatic character. The introductory question is how best can a student be led to acquire knowledge to obtain it firmly in a form that places a minimal strain upon his memory, and to transfer it to the widest range of situasions to which it is applicable.

> "With help a student can often discover the structure of a field by developing his own appropriate heuristics. This procedure is contrasted with the fairly common practice of asserting the structure and showing afterwards that it is appropriate for organizing and retaining a large amount of material" --- "There is, of course, a cost factor in all this. How much gain does the student get from discovering a structure on his own in contrast to the time saved by having it taught him by assertion? (31)

From the concepts 'structure' and 'discovery' there are lines running towards the issue of sequencing of the subject matter. In one case the starting point is curriculum projects in mathematics:

> "Recent work on the nature of learning in mathematics suggest that there are certain stages of development in grasping mathematical concepts when it may be better to keep the formal apparatus of the subject in the background so as to give the students an opportunity to get an inductive, implicit grasp of the structure of the subject".(32)

In another case the starting point is a review of the research by Piaget and Inhelder. And then the following proposition is put forward:

> Might it be possible or even highly advisable, to "speed the subject through the stages of thinking" by appropriate pedagogical devices designed spesifically to give the subject training in the next stage beyond the one in which he finds himself".(33)

In the four other resports the terms and their corresponding issues occur only in two of them, namely in the report "Intuitive Thinking" and "Sequence". In the first one there is clear relationship between "structure" and "intuitive thinking". The question is: "Does emphasis in teaching upon the structure - the interrelatedness - of knowledge in a given field - increase facility in intuitive thinking?" It goes on to say that "those concerned with the improvement of the teaching of mathematics often emphasize the importance of developing in the student an understanding of the structure of mathematics".(34) And it says that the same is true for physics.

In the second the terms 'structure' and 'facts' are presented as

opposed to one another. References are made regarding the importance "to recognize variety and structure within what might otherwise be a mere sequence of facts".[35] In this report we also find the term 'discover'. It occurs in connection with the question about the objectives of learning and teaching. Three purposes are given: 1. Acquiring the ability to discover generalizations on one's own. 2. Acquiring routine skills. 3. Enlarging one's store of factual information and arrange these facts in a meaningful way. In relation to the first purpose the report says:

> "It seems obvious on a priori grounds that a learning sequence which proceeds from elementary data to final verbalized generalizations is the ideal way of achieving the first purpose - training pupils in methods of individual discovery. Indeed it is probably not an accident that the new courses which utilize this sequence are in large part the product of university people who have chosen scientific discovery as a career." The report adds however: "Inspite of the compelling nature and the a priori arguments it is not too early to recommand specific investigations about how far one can go in emphasizing the acquistion of intuitive and preverbal mechanisms at the expense of more formal methods". An in addition there are some cautionary notes: "It is essential that every pupil reach the point of accepting and relying on other people's discoveries and conclusions,for he can never have time or energy to discover everything himself".[36]

So in these two last reports we find no programmatic definitions that are worth mentioning. On the contrary, we might say that the descriptive definitions serve to moderate the stipulative ones.

As one might expect neither the statement 'Any Subject can be taught' nor any linguistic pre-formulation for that statement, is to be found in any of the reports. And in just one of them, the report on "Sequence", the issue is under discussion. Here we find the problem concerning the age at which a child is ready to grasp certain levels of abstraction. It is seen in connection with experience from the new mathematics and science courses, where one has found it appropriate to introduce concepts first at an intuitive level and then move towards abstractedness and rigor. In addition, there is an allusion to the so-called spiral approaches to course planning "intuitively arrived at".(37)

It becomes obvious that the words and formulations we are concerned with occur at the second of our four stages. They occur in contexts that defines them as being stipulatively. However, we have noticed that the same words and formulations have a tendency to occur in a different context when used by the group where Jerome S. Bruner was a participant. In these contexts the terms are sometimes given a programmatic meaning.

At the third stage consisting of Jerome S. Bruner's "Process of Education" the whole mood of thought takes on a programmatic colouring. This mood is reflected by the frequently used programmatic definitions, by the frequent occurence of formulations like "should be" and "must be", and by the reference to prospective new research programs.

The slogan-like formulation of 'Any Subject can be taught' of which we found just weak indications in the preceeding period,

now turns up for the first time:

> "We begin with the hypothesis that any subject can be taught effectively in some intellectually honest form to any child at any stage of development. It is a bold hypothesis and an essential one in thinking about the nature of a curriculum. No evidence exists to contradict it; considerable evidence is being amassed that support it". (38)

Bruners forceful and active style of writing and his bold claim that considerable evidence "is being amassed", indicate a strong programmatic mood.

When the concept of 'structure' is first introduced in Bruner's book we may see a similar programmatic tendency. Reference is made to "a subject", and simple examples from biology, mathematics and learning of language are given. However, the whole account ends up with a statement so general in character that the subject matter is hardly distinguishable. "To learn structure, in short, is to learn how things are related". (39)

Also, 'learning by discovery' is being introduced with reference to work already performed by scholars and scientists in connection with large-scale revision of curricula. From Bruner we learn, however, that the matter is left unsettled:

> "Mastery of the fundamental ideas of a field involves not only the grasping of general principles, but also the development of an attitude toward learning and inquiry, toward guessing and hunches, toward the possibility of solving problems on one's own." ---

> "To instill such attitudes by teaching requires something more than the mere presentation of fundamental ideas. Just what it takes to bring off such teaching is something on which a great deal of research is needed." --- "Various people who have worked on curricula in science and mathematics have urged that it is possible to present the fundamental structure of a discipline in such a way as to preserve some of the exciting sequences that lead a student to discover for himself." (40)

Bruners passion for future research of which we already have got a feeling,is also reflected in the index of the book. The actual heading word in the index is not "Research" but "Research need for". And under this heading we find as many as fifteen references to non-existent or hypothetical research programs. Reference to existing curriculum projects upon which the conference itself was based - SMSG, BSCS, PSSC, and two mathematics projects at the University of Illinois - are given scant sixteen references, which even includes references to the people involved. (41)

Dealing with the concept of 'structure' Bruner writes about "kinds of research needed to help in preparing curricula with emphasis on structure". Later on he strengthens his statement: "Much research is needed on this promising topic - research not only on the usefulness of such an approach, but also on the kinds of general scientific ideas that might be taught". (42) And he concludes the chapter "The Importance of Structure" as follows:

> "What is abundantly clear is that much work remains to be done by way of examining currently effective practices, fashioning curricula that may be tried out on an experimental basis, and carrying out the kinds of research that can give support and guidance to the general

effort at improving teaching".[43]

In connection with "Learning by Discovery" he also says that a great deal of research is needed.[44] And the chapter "Readiness for Learning" concludes: "one can only propose that appropriate research be undertaken with the greatest vigour and as soon as possible".[45] In the chapter "Intuitive and Analytic Thinking" we also find, repeatedly reference to "research that should be given all possible support".[46] And so is the case in the chapter "Motives for Learning".[47]

IV

There seems to be a smooth transition from the programmatic definitions of the third stage of which Bruner had the responsibility, and the slogans of the fourth. The scientist Jerome S. Bruner seems to have supported this transition in several ways.

His purpose when writing "The Process of Education" was hardly to produce "a more scholarly volume".[48] More likely, he was aiming at supporting the already existing reform movement with vigour and enthusiasm, and to bend it into a track which to him appears appropriate. This end must have justified his non-academic means. For besides making use of the threefold set of terms with which we are dealing, in such a way that slogans are close at hand, he also frankly employs a couple of predominant words of his own time - 'excellence' and 'democracy' - in contexts, which make them function almost like slogans. For instance:

> "We may take as perhaps the most general objective of education that it cultivate excellence, --- helping each student achieve his optimum intellectual development." --- " One thing seems clear: if all students are helped to the full utilization of their intellectual powers, we will have a better change of surviving as a democracy in an age of enormous technological and social complexity." (49)

In the fourth stage it also happens that Bruner, at least on one occasion, make use of the Woods Hole Conference in a manner that might be characterized as next to improper. Says he:

> "To understand a field fully is to have grasped its underlying simplicity, and it is with this underlying simplicity that one begins the task of teaching.
>
> But is it simple enough for children? It was the conclusion of a group of scientists and educators, called together by the National Academy of Sciences in the summer of 1959, that any subject could be taught in an intellectually honest form to anybody at any age. This is a daring hypothesis, and there is no evidence to contradict it. But it requires some explanation."(50) (My emphasis)

V

My claim is that the popular educational slogans of the sixties, "Structure", "Discovery", and "Any Subject can be taught" are to be considered side effects of the American behavioral sciences, and I have made attempts to show this as follows: I have focused the development that took place before the terms appeared as

pure slogans. The span of time of this development is not longer than one decade, nevertheless it has been divided into characteristic stages. The first stage reaches from the early fifties up to the Woods Hole Conference, the second includes the discussion during the conference itself, and the third is represented by Jerome S. Bruner's book "The Process of Education". In the fourth stage, that stage which was introduced by simplified interpretations of Bruner's book, the pure slogans come into being.

I have tried to show the hidden connection between the slogans in concern and the behavioral research tradition in the U.S. in two ways. First, I have pointed out that, at the stages described, there is a change taking place in the educational discourse, from emphasis on both logical and psychological aspects of education into the latter alone. Second, by applying Israel Scheffler's distinctions of educational statements I have tried to show that the language of education at the same stages changes from mainly descriptive definitions into stipulative ones, and further through programmatic definitions into slogans.

Both kinds of change occur under the influence of behavioral sciences. Because of the fact that psychologists and educational psychologists, progressively entered the educational scene, and, more fundamental, that the discourse assumes a style of thought typical for the behavioral sciences. We have to do with a kind of educational discourse where general psychological categories take the place of subject matter or logical oriented categories, and where stipulative definitions are given higher rank than descriptive ones.

Notes

1. Robert W. Heath, ed, New Curricula (New York: Harper and Row, 1964), pp. 10-11, pp. 69-70, pp. 82-83, pp. 98-100.
2. Claude W. Gatewood and Ellsworth S. Obourn, Improving Science Education in the United States. Journal of Research in Science Teaching, I (1963), p. 356.
3. Jerome S. Bruner, The Process of Education (Cambridge, Mass. 1960), p. VII.
4. See the list of members, Bruner, p. VI.
5. See the five unpublished reports of panels of the Conference on Fundamental Processes in Education, Woods Hole, Massachusetts, September 9-18, 1959, "Sequence", pp. 1-15, "Apparatus of Teaching", pp. 1-23, "Motivation", pp. 1-24, "Intuitive Thinking, pp. 1-7, "Congnitive Factors in Curriculum Design", pp. 1-26. Archives of The National Academy of Sciences. Washington, D.C. - Conf. Bruner, p. XI.
6. "Apparatus of Teaching", pp. 10-15.
7. "Motivation", pp. 2-3.
8. "Intuitive Thinking", pp. 1-3.
9. "Sequence", pp.1.
10. "Congnitive Factors in Curriculum Design", pp. 21-26, and p.10. See also Bruner, The Process of Education, p. 41.
11. Compare for instance these parts of the report with following articles of Bruner: "Learning and Thinking", Harvard Educational Review, 29 (1959), pp. 184-92. - "Inhelder and Piaget's "The Growth of Logical Thinking", The British Journal of Psychology.50 (1959), pp.363-70. - "The Functions of Teaching". Rhode Island College Journal, I (1960), 2, pp. 35-42, 49. - "Looking at the Curriculum". Educational Courier, 33 (1963), 3, pp. 18-26.
12. "Congnitive Factors--", p. 2.
13. Ibid, p.3
14. Ibid, p.3, p. 4, p.5
15. Ibid, pp.5-6.

16. Ibid, p. 13.

17. Ibid, p. 17.

18. See for instance Mark M. Krug, John B. Poster, William B. Gillies, The New Social Studies. Analysis of Theory and Materials (Itasca: F.E. Peacock, 1970), pp. 164-67.
- William T. Lowe, Structure and the Social Studies (Itasca: Cornell University Press, 1969), pp. 71-73.

19. Bruner, The Process of Education, p. 11, p. 17, pp. 23-26; see also p. 6.

20. Israel Scheffler, The Language of Education (Springfield: Thomas, 1960, eighth printing 1971), p. 11.

21. Ibid, p. 22.

22. Ibid, p. 36.

23. Ibid, pp. 23-24.

24. Heath, New Curricula, pp. 10-11.

25. "Congnitive Factors in Curriculum Design", p.22.

26. Ibid, p. 23.

27. Ibid

28. Ibid, p. 24

29. Ibid, p. 1.

30. Ibid, pp. 6-8.

31. Ibid, p. 13; see also p. 14.

32. Ibid, pp. 5-6.

33. Ibid, p. 18.

34. "Intuitive Thinking", p. 4.

35. "Sequence", p. 7.

36. Ibid, pp. 9-10.

37. Ibid, p. 6.

38. Bruner, The Process of Education, p. 33.

39. Ibid, pp. 6-7.

40. Ibid, pp. 20.

41. Ibid, Index, pp. 95-97.

42. Ibid, p.12, p. 27.

43. Ibid, p. 32.

44. Ibid, p. 20, p. 29.

45. Ibid, p. 54.

46. Ibid, p. 68, p. 55, p. 61, p. 66.

47. Ibid, p. 73, p. 80.

48. Ibid. p. XV.

49. Ibid, pp. 9-10.

50. Jerome S. Bruner, "Looking at the Curriculum". Educational Courier, 33 (1963), 3, p.22..